# MULTIMEDIA UNIVERSITY

# FINAL EXAMINATION

### TRIMESTER 2, 2018/2019

## DBM5018 – BUSINESS MATHEMATICS
(For Diploma students only)

4 MARCH 2019
2.30 p.m – 4.30 p.m
(2 Hours)

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## INSTRUCTIONS TO STUDENT

1. This question paper consists of 3 pages excluding cover page and appendix.

2. Attempt **ALL FOUR** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the Answer Booklet provided.

4. Key formulae are given in the Appendix.

## Question 1

a) You are the manager of Sassy Outfit, a clothing company. The production cost for a piece of T-shirt is RM12 and the fixed cost is RM26,000. The selling price is RM25 per piece.

    i) What is the profit function?                                (2 marks)

    ii) How many you should sell to break even?                     (2 marks)

b) Given the demand function, $p = 10 - 3q$ and supply function, $3p = q + 10$. Find the

    i) quantity equilibrium.                                    (3 marks)

    ii) price equilibrium.                                      (2 marks)

c) Solve the following inequality and express your answer in interval notation. (4 marks)

$$\frac{3x+4}{8} > 7(x-2)$$

d) Find the value of $m$ given that $\dfrac{\sqrt{9x^{10}y^{12}z}}{27xy^6 z} = \dfrac{x^4}{9z^m}$.           (5 marks)

e) The Beauty Saloon has two outlets, A and B. Its popular services are perming, dye and treatment. The monthly sales for two months are given in the following tables:

*November Sales*

|  | A | B |
|---|---|---|
| Perming | 300 | 360 |
| Dye | 840 | 960 |
| Treatment | 1400 | 1050 |

*December Sales*

|  | A | B |
|---|---|---|
| Perming | 400 | 800 |
| Dye | 1200 | 1000 |
| Treatment | 1000 | 900 |

If 5% staff commission is deducted based on total sales for both months, which outlet has the highest earnings? *[Use Matrix Method]*           (7 marks)

**[TOTAL 25 MARKS]**

**Continued...**

## Question 2

a)  Shah would like to invest RM95,000 in a financial plan. He has surveyed the financial plan which offered by three different banks. The interest rate that offered by each bank is given in the following table:

| Bank | Offer for 15 years plan |
|------|--------------------------|
| A | 4.4% compounded quarterly |
| B | 2.4% compounded annually |
| C | 3.6% compounded monthly |

   i)   What is the amount of interest that Shah can earned from each bank?   (15 marks)
   ii)  Which bank should Shah choose? State your reason.                          (2 marks)

b)  Find the future value after investing RM1,250 annually for 9 years at a simple interest rate of 4.5%.                                                                                       (3 marks)

c)  Yatie apply loan of RM50,000 to renovate her house. Ocean Bank offer the interest rate of 4% compounded semi-annually. Calculate her periodic payment if she needs to repay the loan in 10 years.                                                                 (5 marks)

**[TOTAL 25 MARKS]**

## Question 3

a)  Given $m(x) = px^3 - 2x^2 + 3\ln x$.
   i)   Find $m'(x)$.                                                                           (3 marks)
   ii)  Find value of $p$ if $m''(2) = 9$. *[Express your answer in two decimal places]*
                                                                                          (6 marks)

b)  Find the derivative of $y = 10x^3 (x+8)^2$ by using the **Product Rule**.      (6 marks)

c)  Given a function $f(x) = \dfrac{5}{(2x^2 + 10)^3}$. Use the **Chain Rule** to find $f'(x)$.   (5 marks)

d)  Permata Holdings has 250 share lots to sell. If they sell $x$ share lots, their monthly profit is given by $P(x) = x^2(7 + 2x) - \dfrac{1}{2}$.
   i)   Find the marginal profit, $P'(x)$.                                               (3 marks)
   ii)  Evaluate the marginal profit when $x = 250$.                               (2 marks)

**[TOTAL 25 MARKS]**

**Continued...**

## Question 4

a) Given $\int_{-2}^{3} f(x)dx = 5$, find $\int_{-2}^{3} [12 - f(x)]dx$.          (4 marks)

b) Given that $\int_{1}^{5} f(x)dx = 12$, find the value of $m$ if $\int_{1}^{5} [mx^3 - f(x)]dx = 74$. *[Express your answer in two decimal places]*          (5 marks)

c) Evaluate the following integral $\int_{2}^{7} \frac{5 + x^2}{x} dx$.          (5 marks)

d) Solve $\int \pi(2\pi x - 1)^2 dx$ by using the **Substitution Rule**.          (5 marks)

e) Company SOLAR will get a revenue of RM700 000 when they sell 30 units of product with a marginal revenue, $R'(q) = 200q + 30q^2$. Find the revenue function, $R(q)$.

          (6 marks)

**[TOTAL 25 MARKS]**

**End of Page.**

# APPENDIX – FORMULAE

| Inequality | Solution |
|---|---|
| $\lvert x \rvert < a$ | $-a < x < a$ |
| $\lvert x \rvert \leq a$ | $-a \leq x \leq a$ |
| $\lvert x \rvert > a$ | $x < -a$ or $x > a$ |
| $\lvert x \rvert \geq a$ | $x \leq -a$ or $x \geq a$ |

| Simple Interest $I = Prn$ | Future Value $FV = PV(1+r)^n$ |
|---|---|
| Present Value Annuity $A = R\left[\dfrac{1-(1+r)^{-n}}{r}\right]$ | Future Value Annuity $S = R\left[\dfrac{(1+r)^n - 1}{r}\right]$ |

Derivatives

| | |
|---|---|
| 1. $\dfrac{d}{dx}\left(x^n\right) = nx^{n-1}$ | 2. $\dfrac{d}{dx}\left[g(x)\right]^n = n\left[g(x)\right]^{n-1}\cdot g'(x)$ |
| 3. $\dfrac{d}{dx}\left[f(x)g(x)\right] = f(x)g'(x) + g(x)f'(x)$ | 4. $\dfrac{d}{dx}\left[\dfrac{f(x)}{g(x)}\right] = \dfrac{g(x)f'(x) - f(x)g'(x)}{\left[g(x)\right]^2}$ |

| Logarithmic Functions | Exponential Functions | Chain Rule |
|---|---|---|
| $\dfrac{d}{dx}(\ln x) = \dfrac{1}{x}$ | $\dfrac{d}{dx}\left(e^x\right) = e^x$ | $\dfrac{dy}{dx} = \dfrac{dy}{du}\cdot\dfrac{du}{dx}$ |
| $\dfrac{d}{dx}\ln u = \dfrac{1}{u}\cdot\dfrac{du}{dx}$ | $\dfrac{d}{dx}e^u = e^u\dfrac{du}{dx}$ | |

Integration

| | |
|---|---|
| 1. $\displaystyle\int k\,dx = kx + C$ | 2. $\displaystyle\int x^n\,dx = \dfrac{x^{n+1}}{n+1} + C, \quad n \neq -1$ |
| 3. $\displaystyle\int e^x\,dx = e^x + C$ | 4. $\displaystyle\int \dfrac{1}{x}\,dx = \ln x + C$ |
| Definite Integral, $A = \displaystyle\int_a^b f(x)\,dx = F(b) - F(a)$ | |